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AUTHOR	Klinzing, Hans Gerhard
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ABSTRACT

A program was developed for the improvement of social competence in general among professionals with the improvement of the accuracy of decoding emotions from facial expressions as the specific focus. It was integrated as a laboratory experience into traditional lectures at two German universities where studies were conducted to assess the effectiveness of the program, evaluate the program through participant responses, test the relative effectiveness of individual work and cooperative learning conditions, and study gender effects. Subjects were 49 education students at a university where the lecture was a requirement and 31 students at a university where the program lecture was elective. The lecture included theoretical background knowledge about nonverbal aspects of communication, training based on training modules for expressions of affects and blends of expressions, practice decoding emotions from facial expressions in photographs, and discussion after the posttest. The posttests, administered 1 week after training, were based on 54 portraits of women and men. Results show considerable and statistically significant improvements in the accuracy of both intuitive and analytic judgments in decoding affects from facial expressions as a result of the training. Analytic ability appeared to be enhanced by cooperative learning conditions, and no significant gender effects were observed. (Contains 78 references.) (SLD)

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IMPROVING ACCURACY OF DECODING EMOTIONS FROM FACIAL EXPRESSIONS BY COOPERATIVE LEARNING TECHNIQUES.

TWO EXPERIMENTAL STUDIES

Hans Gerhard Klinzing
(University of Tuebingen & University of Stuttgart, FRG)

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Hans Gerhard Klinzing (1)
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Introduction

Although the improvement of social competence is of tremendous importance for many professionals, especially those involved intensively in human interaction (e.g., teachers, psychotherapists, ministers, business executives), it is largely neglected in courses of professional study at universities in Germany. A fundamental part of social competence is skill in nonverbal communication (Knapp & Hall, 2002, 71f). Not only the ability to send but also the *accuracy of decoding* or receiving nonverbal cues matters greatly in daily life. Strong research evidence suggests that understanding socially agreed meanings for nonverbal signs and signals is key for effective communication (e.g., Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979; Knapp, 1979; Knapp & Hall, 2002). Variations in the ability to judge nonverbal communication contribute in important ways to the outcomes of interactions between communicators, in both, formal and in informal settings. For example, during the actual process of communication, individuals must continually make judgments about how successfully they are exchanging information. As an audience becomes larger, verbal feedback becomes more limited and the communicator becomes increasingly dependent on nonverbal cues from the audience. This is especially true in formal settings such as those encountered by teachers where *"... continuous feedback that can be matched against what a communicator has been attempting to get across tends to improve the effectiveness of communication"* (Jecker, Maccoby; Breitrose, & Rose, 1964, 393).

The importance of ones ability to judge nonverbal cues is also evident in research on personal correlates of receiving ability. Skilled decoders of nonverbal signs and signals are also shown to possess the following personal characteristics: They have been found to be "better adjusted, less hostile and manipulating, more interpersonally democratic and encouraging, more extraverted, less shy, less socially anxious, more warm, more empathic, more cognitively complex and flexible." (Knapp & Hall, 2002, 85). In keeping with possession of these desirable characteristics, skilled nonverbal decoders are more self-monitoring, are considered more popular and sensitive to the needs of others, and report higher levels of warmth and satisfaction in their own personal relationships. (Knapp & Hall, 2002; Hall, 1998). There is also a positive relationship between nonverbal judgment ability (rated by clinical supervisor) clinical ability (Rosenthal et al., 1979, 300f), and patients' satisfaction with their physicians (DiMatteo, Hays & Prince, 1986; DiMatteo, Taranta, Friedman, & Prince, 1980). All these findings document the importance of sensitivity to nonverbal signs and signals in effective communication.

However, research also indicates (Jecker, Maccoby; Breitrose, & Rose, 1964; Rosenthal et al., 1979) that professional communicators, like teachers clinicians, or business executives, do not accurately interpret visual cues. On-the-job-training or mere experience in using such nonverbal cues is not sufficient to improve the communicator's ability to receive and interpret accurately (Jecker et al., 1964; Rosenthal et al., 1979; Knapp & Hall, 2002). Consequently, it

seems worthwhile to advocate educational techniques that develop the nonverbal communication skills of professionals who engage regularly in intensive human interaction.

Purpose of Studies

A program was developed for the improvement of social competence in general among professionals, and the improvement of the accuracy of decoding emotions from facial expressions in specific, and integrated as a laboratory experience into traditional lectures at several universities. At two German Universities, two studies were conducted to assess the effectiveness of the program, to evaluate the program by the participants, to test the relative effectiveness of individual work and cooperative learning techniques, and to study gender effects.

Rational/Review of Research

Since the beginning of the 20th century (see Rudolph, 1904), programs related to the improvement of this important aspect of social competence were developed in the fields of psychology and education and studied for their effectiveness since the 1920s (Rosenthal et al., 1979, Klinzing & Tisher, 1986; Klinzing & Jackson, 1987; Schiefer, 1987). A literature search (about 700 references) was conducted to identify the most promising methods for enhancing nonverbal sensitivity and to develop a program of laboratory experience, recommended by Metcalf (1995) and others, which can easily augment a traditional curriculum of lectures and seminars. Findings from 75 projects were judged to be relevant to the purpose of this review and have been integrated (Glass, McGaw, & Smith, 1981). These studies and their findings are listed in *Tables 1, 2, and 3*.

Table 1: **Studies on the Enhancement of Nonverbal Perceptiveness: Effects of Pretesting (Retaking a Decoding Test).**

Author/Variable/Context	Treatment/Test	Results/Effect Size (ES)	
1) *Jenness, 1932, study 3 (1)* Accuracy of reading faces; 57 university students	Drawings from Rudolph (1903); retest after 15 minutes;	ES = -0.08s (2)	0
2) *Jenness, 1932 study 4;* Accuracy of reading faces; 99 university students	Drawings from Rudolph (1903); retest after three months	ES = 0.02s (2)	0
3) *Kline & Johanssen (1935);* Recognizing emotions from face and/or body; 125 university students	2 x 20 slides; retest after one week	ES = 0.34s (2)	++
4) *Walton (1936)* (1) Accuracy in decoding facial expressions;	Still photographs	ES = 0.22 (2)	+
5) *Mittenecker (1960), study 1;* Estimation of intelligence of persons; shown on pictures 2 groups of adults (N = 48)	Still photographs; retest in the same session;	ES = (3)	+

Table 1 (continued)

6) Ekman & Hoffman (1963) (1)	Correctness of the subject's judgments of whether a still photo has taken during a stressful or cathartic phase of an interview	ES (3)	+
7) *Davitz (1964)* (1) *Tone of voice* 22 university students	Still photographs	CG: ES = 0.45s	++
8) *Miller et al., (1975)* (1) Decoding nonverbal behavior	Film;	ES = 0.0s (2)	0
9 - 12) *Rosenthal et al. (1979),* Nonverbal sensitivity; four groups from US-high school (N=37), US-college (N=28), AUS –university (N=74), US-university (N=17)	220 scenes on film; Full PONS-test (without feedback); average of six weeks between testings; (results of the four studies combined) ;	ES = 1.79s (2)	++
13) *McCoid (1)* Nonverbal sensitivity 56 undergraduate students (educational psychology)	Full PONS –test;	ES = 1.96s (2)	++
14 – 21) *Rosenthal et al. (1979),* Nonverbal sensitivity, Eight samples, N = 1260	Comparison of the first half to the last half of the PONS-test;	Results of the eight studies combined: ES = 0.89s	++
22) *Klinzing et al. (1984b)* Nonverbal sensitivity University students	220 scenes on film: PONS-test; Pre – posttest of a control-group without training (posttest after one week);	test – retest ES = 1.21s	++
23) *Klinzing et al. (1985)* Nonverbal sensitivity 23 university students	220 scenes on film: PONS-test pretest I – posttest I of a control-group without training;: posttest I (after assertiveness training and PONS as a pretest) – posttest II after one week:	ES =1.17s ES = 0.65s	++ ++
24) *Klinzing & Leuteritz (1986, study 1)* Nonverbal sensitivity; 13 university students	220 scenes o0n film: PONS-test; pretest – posttest of a control-group; retest after two days;	ES = 0.88s	++
25) *Klinzing & Leuteritz (1986, study 2)* Nonverbal sensitivity; 12 university students	220 scenes on film: PONS-test; pretest – posttest of a control-group after two days week;	ES = 1.79s	++

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***Table 1a*: Experimental Studies to Explore the Test Effect of the PONS-Test**

Author/Variable/Context	Treatment/Test	Results/Effect Size (ES)	
26) *Phillips, 1975 (1)*	Full PONS-test; posttest-only-control-g.;	ES = 0.63s	++
27) *Pinnas (1979) (1)*	PONS-test: posttest-only-control-g. (retest after three weeks)	ES = 1.23s	++
28) *Klinzing et al. (1984a)* Nonverbal sensitivity; 24 University students	220 scenes on film: PONS-test; posttest-only control-g; retest after two days;	Experimental vs. control - group: ES = 1.05s	++
29) *Klinzing et al. (1986, study 7);* Nonverbal sensitivity; 19 University students	220 scenes on film: PONS-test; posttest-only-control-g.; retest after one week	Experimental vs. control-group, ES = 1.28s	++
30) *Klinzing (2000, study 3)* Nonverbal Sensitivity 29 University students, studying Education	220 scenes on film: PONS-test; posttest-only-control-g.; retest after one week	Experimental vs. control-group, ES = 2.21s	++
31) *Klinzing (2000); study 4* Nonverbal Sensitivity 25 University students, studying Education	220 scenes on film: PONS-test; posttest-only-control-g.; retest after one week	Experimental vs. control-group, ES = 2.20s	++

Summary of Table 1: 31 studies, 32 findings; Number of studies with practically no effect: 3; Number of positive findings (vote counting): 29; number of significant positive effects: 26; number of negative effects (vote counting): 0; Overall ES = **0.91s** (from 30 findings; in two studies there were insufficient data to calculate ES); findings from the six experimental studies to explore retest-effects: ES = **1.43s**.
One study reported in Rosenthal et al. (1979) with high school students is not reported here because it was a re-analysis of several studies with different purposes.

Table 2: **Studies on the Enhancement of Nonverbal Perceptiveness With Different Kinds of Treatments Using Pre-experimental Design (Pre- Posttest Studies)**

Author/Variable/Context	Treatment	Test/Results/Effect Size (ES)	
1) *Allport (1924);* Accuracy in reading faces; 12 young woman	15 minutes discrimination training based on drawings from Rudolph (1903);	Drawings from Rudolph (1903); ES = 0.55s (2)	++
2) *Guilford (1929);* Accuracy of reading faces; 15 students (social psychology)	10 seminar sessions (anatomy of the face + practice in reading, faces with feedback) based on Rudolph (1903) (20 hrs);	24 drawings from Rudolph (1903); ES = 1.68s (2);	++
3) *Jenness (1932), study 1 (1);* Accuracy of reading faces; 66 University students	Replication of the study of Allport (1924) No.: 2.1 Discrimination training: 15 min.;	Drawings from Rudolph (1903); ES = 0.52s	++
4) *Jenness (1932), study 2 (1);* Accuracy of reading faces; 29 University students	45 minutes discrimination training, based on Rudolph (1903);	Drawings from Rudolph (1903); ES = 0.98 (2)	++
5) *Mittenecker (1960), study 2;* Judging intelligence of pupils; 34 adults	Discrimination training with feedback	24 still photographs; ES = (3)	++
6) *Lanzetta & Kleck (1970) (1);*	Feedback and punishment	ES = 0.0s	**0**
7) *Kohnle (1971) (1);*	Discrimination training	ES = 1.14(2)	++
8) *Mohammed (1974) (1);*	Encounter groups	PONS-test; ES = 1.26s (2)	++
9) *Klinzing et al. (1983), preliminary field test;* Nonverbal sensitivity; 11 University students,	Theory presentation, skill acquisition exercises, practice in microtraining format with feedback. (about 35-40 hours)	PONS-test; ES = 1.34s;	++
10) *Klinzing et al. (1983), study 1;* Nonverbal sensitivity; 21 university students	Treatment as in No. 9 plus discrimination training- (duration about 40 hours);	PONS-test; ES = 1.77s	++
11) *Klinzing et al.,(1983), study 2;* Nonverbal sensitivity; 23 university students	Treatment as No. 10;	PONS-test; ES = 1.66s	++
12) *Klinzing et al. (1983), study 3;* Nonverbal sensitivity; 12 university students	Treatment as in No 10;	PONS-test; ES = 1.25s	++
13) *Klinzing et al. (1983), study 4;* Nonverbal sensitivity; 25 university students	Treatment as in No 10;	PONS-test; ES = 1.49s	++
14) *Leuteritz (1987), study 3;* Nonverbal sensitivity 16 university students	16 exercises from the Inter-actional Improvisation Method (gaming), 3 days, 18 hrs.	PONS-test; ES = 1.49s	++

Summary of Table 2: 14 studies, 14 findings; findings, virtually no effects: 1; positive findings (vote counting): 13; positive significant findings ($p < 0.5$): 13; Overall ES = **1.16s** (N = 13); insufficient data to calculate ES: 1).

Table 3: **Studies on the Enhancement of Nonverbal Perceptiveness With Different Kinds of Treatments Using True Experimental Designs (or at least a non-Equivalent Control Condition)**

Author/Variable/Context	Design/Treatment	Test/Results/Effect Size (ES)	
1) *Mittenecker (1960), study 1;* Judging intelligence of pupils; 3 groups of adults	*Posttest-only-non-equivalent.-comparison-g.* Discrimination training based on still photographs	21 still photographs;	
(N= 24, 14, 10)	- with feedback:		++
	- without feedback, and		0
	- with feedback from pretesting;	ES = (3):	0
2) Ekman & Hoffman (1963) (1)	*Pretest-posttest-control-g.* Feedback on the correctness of the subject's judgments of whether a still photo has taken during a stressful or cathartic phase of an		
	interview vs. no training;	ES (3)	++
3) Ekman & Hoffman (1963) (1)	*Pretest-posttest-control-g.* Feedback on the correctness of the subject's judgements of whether a still photo has taken during a stressful or cathartic phase of an		
	interview vs. no training;	ES (3)	+
4) Ekman & Hoffman (1963) (1)	*Pretest-posttest-control-group* Feedback on the correctness of the subject's judgments of whether a still photo has taken during a stressful or cathartic phase of an		
	interview vs. no training;	ES (3)	+
5) Hoffman (1964) (1)	*Pretest-posttest-comparison-groups.* Feedback on the correctness of the subject's judgments of whether five-second silent motion picture clips were taken during a stressful or cathartic phase		
	of an interview (all groups combined);	ES (2) = 1.78s	+
6) *Davitz (1964)* (1)	*Pre--posttest-control g.*	EG: ES = 0.78s	
Tone of voice	Practice in decoding	CG: ES = 0.45s	++
44 university students	with feedback *vs.* no training.		
7) *Jecker et al. (1965); Accuracy in judgement student comprehension;*	*Pre-posttest-comparison-g.* 6 – 8 hours discrimination training based on film clips *vs.* 6 – 8 hours	Rating of student comprehension while answering a question (about 84 – 100 film clips)	
40 graduate students	of film demonstration of nonverbal communication	ES = 0.95s	++
8) *Whitcomb (1966) (4); self acceptance*	*Pre-posttest-comparison-g*	Self perception	
75 student teachers	student teacher program *vs.* student teacher program plus sensitivity training (44 hrs)	ES = (3) (Pre-posttest. ++)	0

Table 3 (continued)

9) *Didier (1967) (4);* Nonverbal sensitivity 48 university students	*Posttest-only-comparison g.* Discrimination training plus practice *vs audio* instruction *vs. audio- visual* instruction	Nonverbal sensitivity Discrimination training: ES = (3)	++
10) Belland (1969) (4); Nonverbal sensitivity 240 children	*Posttest-only-comparison-g.* Audio presentation (A) vs. visual presentation (B) vs. A + B, vs. no training	Nonverbal sensitivity ES = (3); A and B	++
11) *Sutton (1968) (4);* Student perception of empathy 414 student teachers	*Pre-posttest-comparison-g. nonequivalent control g.* Sensitivity training *vs.* belated sensitivity training *vs.* no training;	Empathy: ES = (3) (pre-posttest: ++)	0
12) *Gregg (1968) (4);* 29 student teachers	*Pre-posttest-comparison-g.* sensitivity training with different trainers;	Empathy: ES = (3) (pre-posttest: ++)	0
13) *Reich (1970) Identification of emotions;* 40 student teachers (elementary)	*Posttest-only-control –g.* 4.5 hours sensitivity training *vs.* no training;	32 clips, audio- and videotapes Identification of emotions ES = - 0.50	- -
14) *Strother et al. (1971); Prediction of achievement;* 10 elementary teachers, 40 students	*Posttest-only-control-g.* Two hours coursework with discrimination exercises *vs.* no training;	Judgment of students competency minus students' score in an examination; ES = (3)	++
15) *Courtois (1973) (4); empathetic responses* 33 student teachers	*Pre-posttest control g.* Theory presentation (A) *vs.* discussion (B) *vs.* no training;	Empathetic responses ES = (3) A + B:	++
16) *Phillips (1975); Nonverbal sensitivity* 48 elementary & middle school student teachers	*Posttest-only- nonequivalent-comparison g.* Written materials, student teaching, PONS-test with feedback, suggestions for observing and using nonverbal behavior during student teaching *vs.* student teaching	PONS-test; ES = 0.47s	++
17) *Shapiro (1976); Knowledge about nonverbal communication* 60 Elementary school teachers	*Posttest-only-control g.* coursework *vs.* no training	Knowledge test; ES (3)	++
18) *Hansford (1977); Nonverbal sensitivity* 74 teacher trainees	*Pre- posttest comparison groups* Peer-microteaching with video-feedback plus peer-feedback vs. peer-microteaching with video feedback *vs.* traditional coursework (7 sessions)	PONS-test; ES = (3)	++

Table 3 (continued)

19) *Huntley (1978);* *Ability to recognize Nonverbal behavior* 28 student teachers (elementary and secondary)	*Pre- posttest-control g.* Theory presentation, 35 min. classroom video observation, one microtraining session demonstrated by four trainees (200 min.) *vs.* no training.	Identification of encouraging - discouraging non-verbal behavior on 10-min. Film using IDER: ES = - 0.19s	-
20) *Berkowitz (1979)* (1); *Nonverbal sensitivity;* 25 randomly selected mental health professionals	*Posttest-only-control g.* Lecture, demonstration, practice in judging affects or situations represented in voice delivery, face, or body *vs.* no training;	PONS-test; administered after one week ES = 0.58s	+
21) *Guild (1979)* (1); *Nonverbal sensitivity;* 30 meditators; 30 nonmeditators	*Posttest-comparison-g.* Transcendental meditation (20 min.)-PONS, resting (20 min.)-PONS vs. resting-PONS, meditation-PONS for both groups;	PONS-test; Meditators gained more on the post meditation than on the no-meditation retest, non-meditators gained more on the no-mediation than on the post-mediation test. (ES = 0.64s ++) Mediation vs. non-mediation	0
22) Pinnas (1979) (1)	*Posttest-only-comparison-group* Microcounseling vs. PONS-test;	PONS-test: ES = 0.03s	0
23) Purdom (1979) (1); *Nonverbal sensitivity;* College students	*Posttest-only-control-g* Traditional coursework about nonverbal communication *vs.* no training;	PONS-test; ES = - 0.04s (2)	0
24) Klinzing et al. (1984b); *Nonverbal sensitivity* 34 university students	*Pre-posttest-control-g.* Theory presentation, concept and skill acquisition exercises, discrimination training, practice in microtraining settings with feedback (duration: 30 – 35 hours) *vs.* no training;	PONS-test: ES = 1.03s;	++
25) Klinzing et al. (1985); Nonverbal sensitivity 23 university students	*Pre- posttest-comparison-g.* Assertiveness training (4 ½ days) vs. nonverbal behavior training similar. to that in study No. 24 (4 1/2 days)	PONS-test Assertiveness training plus PONS vs. PONS alone: ES = 0.22s; Nonverbal behavior training plus 2 x PONS vs. assertiveness training plus 2 x PONS: ES = 0.17s (s. Table 1, No. 23)	+ +
26) Klinzing & Leuteritz (1986; see also Leuteritz &, Klinzing, 1992, study 1); Nonverbal sensitivity 36 university students	*Posttest-only comparison g.* Exercises of the Interactional Improvisational Method (IIM, gaming) *vs.* IIM plus modelling *vs.* no training	PONS-test: ES = 0.04s ES = - 0.35s	0 -

Table 3 (continued)

27) Klinzing & Leuteritz (1986; see also Leuteritz & Klinzing, 1992), study 2;	*Posttest-only comparison g* Treatment as in study 26;	PONS-test: ES = -0.51s ES = 0.18s	- +
28) Klinzing (1988); *Nonverbal sensitivity* 20 university students (various subject matters)	*Pre-posttest-nonequivalent comparison-g.* Theory presentation, concept and skill acquisition exercises, discrimination training, practice in microtraining setting with feedback on nonverbal expressiveness *vs.* an equivalent training on verbal presentation skills (lecturing);	PONS-test; ES = 0.69s	++
29) Klinzing (1998; 1999) Decoding emotions from facial expressions 15 University students various subject matters (Preliminary field test)	*Posttest-only- nonequivalent comparison group* Presentation of theoretical background knowledge + exercises in the analysis of portrait photos using descriptions of mimic features in a small group format (jigsaw) *vs.* traditional seminar;	Judging emotions from facial expressions based on 54 photos (Ekman & Friesen, 1975): Intuitive judgment(after a 1 sec.): ES = 0.34s Analytical judgment: (after 6 sec.):ES = 1.78s	 ++ ++
30) Klinzing (1998; 1999) Decoding emotions from facial expressions 30 University students various subject matters (main field test I)	*Posttest-only- nonequivalent comparison group* Training as in No. 29 (exp. gr) vs. traditional seminar;	Test as in No. 29 Intuitive judgment (after 1 sec.): ES = 1.55s Analytical judgment: (after 6 sec.): ES = 2.06s	 ++ ++

Summary of Table 3: 30 studies, 37 findings; findings showing virtually no effects: 9; positive findings (vote counting): 24; positive significant findings ($p < 0.5$): 17; negative findings (vote counting): 5; significant negative findings: 1; overall ES = 0.81s (from 22 findings where sufficient data were provided to calculate ES).

(1) cited from Rosenthal et al., 1979;
(2) ES calculated by Rosenthal et al., 1979;
(3) Insufficient data to estimate ES
(4) reported by Schiefer, 1987

0 : virtually no effect
- : negative (non significant) trend
-- : negative significant finding ($p < 0.05$)
+ : positive (non significant) trend
++ : positive, significant finding ($p < 0.10$)

The results of these 75 studies as reviewed (in part) by Rosenthal et al. (1979), Klinzing & Tisher (1986), Klinzing & Jackson (1987), and Schiefer (1987) (*Table 1, 2, and 3,)* all suggest that, despite wide variations in the design of studies and outcome measures, all contain overwhelming evidence that training can have a positive impact on the *perceptiveness of* and *sensitivity to* nonverbal signs and signals. 66 out of 83 findings show positive results and 56 of them achieved statistical significance in the desired direction. The overall effect size (ES) within the 64 findings in which data were sufficient to calculate ES revealed an **M ES = 0.81s**. Dunkin (1995) describes this as a large magnitude of effect.

The projects which study the impact of training among teachers and other professionals have used a wide range of techniques and produced a variety outcome measures. Among these methods, instructional design has been based on:

- varying degrees of intensive ***identification/discrimination training*** aimed at improving the accuracy of decoding emotions; estimating students' intelligence, evaluating students' levels of comprehension, recalling of knowledge, and judging affects like the degree of "positivity" and "dominance". As training material pictorial representations of the figure of a portrayer as well as particular nonverbal modes/channels of nonverbal communication (e.g. the facial expressions) were used, - shown in drawings, still photographs, or film. In 31 studies (*see Table 1*) which explored the decoding, estimating, evaluating, and judging skills just mentioned, the simple effect of pre-testing alone, retaking a nonverbal decoding test, and using these discrimination exercises, embedded in the tests, was assessed;

- ***combinations*** of theory presentation, skill acquisition exercises, discrimination training, practice, such as the execution of target skills in microtraining settings or other practice venues, and feedback; and on

- ***"indirect training methods"*** (Rosenthal et al., 1979; Klinzing & Jackson, 1987) which employed encounter group sessions, transcendental meditation, sensitivity training, assertiveness training and game-like exercises (e.g., the Interactional Improvisation Method, Leuteritz, 1987) and traditional coursework in nonverbal communication.

Similarly, the time devoted to training has varied substantially from mere 15 minutes in some cases to as much as 40 hours in others.

Next, it is important to note that not all instructional designs are equally effective. Studies which made use of ***Indirect Training Methods*** like assertiveness training, trancendental meditation, game-like exercises, assertiveness training, encounter groups, sensitivity training, or traditional coursework achieved small, non-significant gains or negative results (**M ES = - 0.22s**, see *Table 3*, 8; 11; 12; 13; 21; 22; 25; 26, 27). Though some effects might be overshadowed by the sensitizing effect of pretesting, particularly when a long procedure like the PONS-test was used (*Table 2*, 8, 11, 12, 19, 25). The studies 8 and 14, reported in *Table 2* (Mohammed, 1974; Leuteritz, 1987), revealed large significant gains in nonverbal sensitivity from pre- to posttest. These effects seem to be mainly due to an interaction of the intensive exercises in decoding with the PONS-test in the pretest and the training methods used. *Traditional methods of instruction* (e.g., course work) produced mixed results, some positive (see Table 3, 10; 15), some negative (*Table 3*, 19; 23); the kind and quality of instruction (e.g., concreteness) seem to make the difference. The effectiveness of indirect training methods on nonverbal sensitivity (**M ES = - 0.19s**, N= 7) is therefore uncertain given so limited a research base.

Studies using a ***combination of techniques*** generally achieved significant positive results (see *Table 2*, 9 – 13; *Table 3*, 16, 18, 24, 28). These include a theoretical presentation, opportunities to acquire behavior and/or discrimination training, and also to practice the behaviors learned before sufficiently *in microtraining* (*Table 2*, 9 – 13; *Table 3*, 18, 24, 25, 28) or *real practice settings* (*Table 3*, 16), and processes of intensive feedback (video-recordings, ratings of nonverbal behavior, group discussion). Despite the fact that training procedures were not aimed at the precise dimensions of nonverbal sensitivity being assessed by the criterion test (see e.g., studies 24, 28 in *Table 3*), the overall effect size was: **M ES = 1.21s**. The positive findings in studies using multiple methods reported in *Table 2* seem to

support the findings in *Table 3* though most of the effects obtained might be due to pre-testing when a long technique, like the PONS-test was used (*Table 2*, 9 - 13: ES = 1.50s).

Where training focused on specific and well defined sets of objectives and their related nonverbal behaviors, where *specifically designed practice in decoding nonverbal signs and signals (discrimination training)* was provided, performance could be improved substantially, even in short training programs. Decoding skills were further enhanced by the provision of feedback (Mittenecker, 1960, *Table 3*, 1; Ekman & Hoffman, 1963; Hoffman, 1964: 3.2 - 3.5). Even mere re-testing with a 45 minute test like the Profile of Nonverbal Sensitivity (PONS-test, Rosenthal et al., 1979), which provides massive practice in decoding nonverbal cues within 220 scenes, was shown to be sufficient in improving nonverbal sensitivity (*Table 1*, 9 - 31), thereby invalidating the pre-posttest studies (*Table 2*). Shorter tests (*Table 1*, 1 - 8) show practically no sensitizing effect. The overall effect size for this group of training studies was **M ES = 0.98s.**

In conclusion, even short discrimination training is sufficient to improve nonverbal sensitivity. As a program which is intended to supplement laboratory experience within a traditional curriculum of coursework or lectures, discrimination training, training in analysis of nonverbal behavior and decoding based on written material with pictures seems to be sufficient when time is short (*Table 3*, 29 - 30).

Teaching arranged as ***group work or cooperative learning*** (Slavin, 1983) is defined as *„...individuals working together to maximize their own and each other's productivity and to accomplish shared goals."* (Johnson & Johnson, 1995, 349), and has been subjected to research on its effectiveness in more than 600 studies at the elementary and secondary school levels. Research suggests that cooperative learning techniques, as compared with traditional methods in a whole class format, are more effective in improving academic achievement in most comparisons (e.g., Johnson & Johnson, 1991; Slavin, 1995).

Forms of cooperative learning are not only effective in teaching knowledge, but more importantly, they also support achievement in non-cognitive objectives directed at social competence, such as self esteem, interpersonal relationships, social cohesion, cooperation, altruism, and empathy (e.g., Johnson & Johnson, 1989; 1991; 2000; Slavin, 1995).

Cooperative learning techniques are not only used frequently within elementary and secondary schools but also used at the post-secondary level. Research on the effectiveness of the use of cooperative learning techniques in universities is rare but promising (Slavin, 1992). If social competence is to be enhanced in college teaching, cooperative learning techniques may be an effective pedagogy reaching that goal. To support the process of social competence development, the program for *improving the accuracy of decoding emotions from facial expressions* was developed for use in a cooperative learning environment (Jigsaw).

A pervasive assumption is that in comparison to men women tend to be more socially and emotionally oriented, pay more attention to other peoples' needs, and attend more closely to emotional states and attitudes (Rosenthal et al., 1979, 180ff). In research examining traits associated with accuracy in decoding nonverbal signs and signals one of the most consistent findings is the tendency for woman to be more effective decoders than men. In about 80% of about three dozen earlier studies and studies on 133 samples using the PONS-test to investigate ***nonverbal sensitivity as a main effect of gender*** (Rosenthal et al., 1979), it was

shown that females tend to be more accurate at nonverbal judging than men (M ES = 0.42s). However, one German study using the PONS-test (reported in Rosenthal et al., 1979), found a tendency of higher nonverbal sensitivity for men. Following this study Klinzing (1999; 1998) conducted several investigations with university students using the PONS-test and other tests, and found no significant statistical differences between decoding abilities of men and women. The present research programs presented an opportunity to replicate these earlier studies.

The Program

Enriched by past research on techniques for the improvements of nonverbal sensitivity, the positive effects of cooperative learning methods, and the work of Ekman & Friesen (1975), a training program was developed for group work. Its aim was to improve accuracy in decoding facial expressions of the major emotions (surprise, fear, disgust, anger, happiness, sadness) as well as blends of these expressions (e.g., surprise + happiness) by providing background knowledge about nonverbal communication, discrimination training, techniques for decoding nonverbal signs and signals, and enhancing analytic ability in general. The learning process was based on the following components:

1. *Presentation of theoretical background knowledge about nonverbal aspects of communication*

This component consisted of lectures on nonverbal aspects of communication. These included problems of definition (see e.g., Knapp, 1978), verbal-nonverbal interrelationships, features of nonverbal behavior (e.g., implicitness, openness, subtlety, difficulties in its control and management (Ekman & Friesen, 1975; Mehrabian, 1972), problems of intentionality, immediacy, intrinsic-extrinsic coding, and classifications according to different functions of nonverbal behavior. Research-orientations (e.g., Dunkan, 1969) and methods used in nonverbal research were also sketched. This latter component also included information on *specific knowledge about facial expressions*, focusing especially on the expression of emotions and interpersonal attitudes (Argyle, 1978; Klinzing, 1984; 1993; Smith, 1979; Woolfolk & Brooks, 1983). *(Study 1: 360 minutes, Study 2: 240 minutes).*

2. *Training based on training modules* (written material with still photographs) for expressions of each of the six primary affects and blends of these expressions. The six modules consisted of:

   - A short oral introduction to the psychology of the specific emotion;
   - A precise description of the components and configurations of the specific facial expressions (e.g. surprise) in each of the three areas of the face (*Facial area 1*: brows/forehead; *facial area 2*: eyes/lids/bridge of the nose area; *face area 3*: the lower face area: cheek, nose, mouth, chin, and jaw);
   - Variations in the intensity of the expressions from mild to extreme (including an exercise in imitating and judging levels of intensity with the help of a mirror);
   - Expression of emotions and their meaning when they occur in only one or two of the areas of the face;
   - Affect blends and their expression (with an exercise in imitating and judging of blends);
   - Recapitulation (including exercises with a mirror).

The duration of the intervention using modules in *Study 1* was about 280 minutes, in *Study 2 about 350* minutes.

3. *Decoding emotions from facial expressions* using 54 still photographs showing primary affects, blends and blank faces (with feedback). The results of this decoding test served as post-test (see below).

4. *Discussion.* After completing the post-test, participants were told the research questions, design of the study, and the instruments used. Then t-tests were performed and the results discussed with the participants in light of previous findings.

Assessment of the Effectiveness of the Program and Its Evaluation

Two studies were performed to test relative effectiveness of the program and its underlying theory in two modes of instruction, namely cooperative learning (*Jigsaw*, Slavin, 1983) and individual work. This research also studied gender effects.

Research Questions: The questions to be addressed were:

Study 1:

1. whether the intervention has a significant ($p<.05$) effect on the accuracy of decoding emotions from facial expressions in an *intuitive judgment* (immediate judgment of one second) and *analytic judgment* (repeated judgment after six seconds);
2. whether there is a significant ($p<.05$) improvement from intuitive to analytic judgment;
3. whether the intervention has a significant ($p<.05$) effect on the improvement from intuitive to analytic judgment;
4. whether there is a significant difference ($p<.05$) between male and female trainees in the accuracy of decoding emotions without and with training.

Study 2:

5. whether there is a significant ($p<.05$) difference between treatment conditions (individual work/cooperative learning: jigsaw) on the accuracy of decoding in intuitive judgment, analytic judgment, and improvement from intuitive to analytic judgment;
6. whether there is a significant difference ($p<.05$) between male and female trainees in the accuracy of decoding in the two treatment conditions.

Subjects. 80 university students who were studying pedagogy as a major with or without one or two additional subject matters signed up to participate in these investigations. Both research projects were integrated into lectures on "Nonverbal aspects of communication" at two German Universities. In *Study 1* ($N = 49$) the lecture was taken as a requirement, while in *Study 2* ($N = 31$), the lecture was selected on an elective basis. *Table 4* gives a profile of the participants of both studies based on age, gender, average number of semester completed, and majors studied at the university.

Table 4: **Characteristics of the Participants of the Studies: Age and Average Number of Semester, and Majors Studied at the University for the Studies 1 and 2**

	Gender male (m)/ female (f)	Age	Number of Semesters	Majors: Pedagogy plus Sociology	Arts History	Philology/ Linguistic	History/ Politics	Engineering/Computer Science.	Sport
		M	M						
Study 1	18f								
Experimental Group	11m	23.7	3.8	9	3	8	2	6	1
Control Group	19f 11m	23.1	3.9	7	2	9	3	7	2
Study 2									
	Gender male (m)/ female (f)	**Age**	**Number of Semester**	**Majors:** Pedagogy (only)	Pedagogy plus Sociology			Philology/Theology	
		M	**M**						
Jigsaw	11f 4m	22.7	4.1	12			1	2	
Individual Work	12f 4m	22.4	4.2	13			-	3	

Design of the Studies. The effects of the program were investigated using a control-/comparison group-design. Participants in the studies were stratified by gender, then randomly assigned within strata to the experimental conditions.

The designs can be described as follows (Campbell & Stanley, 1963):

Study 1:

R X1 O1
R -- O2

where

R: represents the random assignment of participants to the experimental condition, stratified by gender;

X1: represents the training program on accuracy of decoding emotions from facial expressions *in group work: Jigsaw* (about 280 minutes),

--: represents no treatment (in the course evaluation using the *Course/Instructor Evaluation Questionnaire*, CIEQ, a preceding lecture on nonverbal aspects of communication served as control for the evaluation of the group work in *Jigsaw* format;

O1 and **O2**: represent the posttests to determine the effects of the treatment.

Study 2:

R X1 O1
R X2 O2

where

R: represents the random assignment of participants to the treatment condition, stratified by gender;

X1: represents the training program on accuracy of decoding emotions from facial expressions *in group work: Jigsaw* based on written material (about 350 minutes);

X2: represents individual work based on the same written material as in X1;

O1 / O2: represent the post-tests for determining the relative effectiveness of the different treatments: Jigsaw and individual work.

Because of organizational limitations the post-test of the control group in *Study 1* was administered three sessions earlier than that for the experimental group.

Data Source. The post-tests, administered one week after training, were based on 54 portraits of women and men (six by nine cm photographs of faces from Ekman & Friesen, 1975). 44 of the portraits showed primary affects, seven showed blends of affects, and three portrayed blank faces. For the administration of the test, all participants were randomly assigned to groups of two. Each trainee showed his/her partner the portraits in a random order, first for one second (intuitive judgment), then again for another five seconds (analytical judgment).

Participant evaluation of the training program. Evaluation was administered in both studies using the *Course/Instructor Evaluation Questionnaire (CIEQ)*. This instrument, developed and redeveloped by Aleamoni and coworkers (Aleamoni & Stevens, 1986) consists of five subscales composed of 21 individual items (four point scales). The subscales are:

- General course attitude (four items)
- Method of instruction (four items)
- Course content (four items)
- Interest and attention (four items)
- Instructor (five items)

Information regarding the reliability and indications of validity of the CIEQ is provided by Aleamoni & Stephens (1986). Studies using the German version of this instrument confirm the findings of Aleamoni and coworkers (e.g., Klinzing, 2002b).

This CIEQ was administered to the control/comparison group of *Study 1* to rate the five sessions of the introductory lecture preceding any work on the laboratory program. The experimental group in *Study 1* and the comparison group in *Study 2* rated the group work on the program for improving nonverbal perceptiveness after completion of the post-test. (Unfortunately, not all of the *Study 1* students participated in this evaluation because it took place three days before Christmas, when some of the students had already left on vacation).

Results

t-tests were performed on all variables.

Decoding Test: Results for Study 1 and 2. Results of these analyses are summarized in *Tables 5, 6, and 7.*

Table 5: **Results for Intuitive Judgment (A) and Analytic Judgment (B) on all Test Items. Means, Standard Deviations, t-Tests, and Effect Sizes (ES) for the Post-tests of the Experimental- and Control Group for Study 1.**

Study 1

Control Group *(N=30)*			**Experimental Group** *(N=29)*			**Control Group vs. Experimental Group**				
A* M (s)	**B** M (s)**	**A-B M (s) t, (p)**	**A M (s)**	**B M (s)**	**A-B M (s) t, (p)**	**A-A t, (p)**	**B-B t, (p)**	**A-B/ A-B t, (p)**	**A-A ES**	**B-B ES**
36.14 (4.29)	37.47 (5.23)	1.33 (2.90) t=2.51 **(0.009)**	41.31 (2.90)	42.67 (3.14)	1.41 (2.61) t=2.85 **(0.004)**	5.41 **(0.00005)**	4.62. **(0.00005)**	0.112 (0.23)	1.21s	0.99s

(One-tailed tests; *A= intuitive rating (immediate judgment of ca. one second.); **B= analytic rating (repeated judgment after ca. six seconds).

As summarized in *Table 5,* results for the Decoding Tests ***(Study 1)*** show a considerable (ES=1.21s; 0.99s) and significant statistical difference ($p < .00005$; $p < .00005$) between the experimental and control conditions for intuitive and analytic judgment, with results favoring the experimental group. Significant improvements also appear from intuitive to analytic judgment in both the experimental and the control conditions ($p < .009$; $.004$).

The differences between the improvements, however, turned out not to be statistically significant ($p < .23$). This finding is repeated by calculating the proportion of positive changes to *all* changes made from intuitive to analytical judgments (*Table 6).*

Table 6: **Results for the Proportion of Positive Changes from Intuitive Judgment (A) to Analytic Judgment (B) to all Changes. Means, Standard Deviations, t-Tests, and Effect Sizes (ES) for Study 1.**

Variable	Control Group (N=30) M (s)	Experimental Group (N=29) M (s)	Experimental-/Control Group t-test t/p	ES
Positive changes/ all changes	0.49 (0.17)	0.56 (0.29)	1.12 p< 0.12	0.40s

* positive changes/positive changes + negative changes (one-tailed-test)

The results in *Table 6* show that the proportion of positive changes to positive plus negative changes are not quite significant (p< .12).

In *Table7* the findings for male and female subjects are summarized.

Table 7: **Findings for Male and Female Participants for Intuitive Judgment (A) and Analytic Judgment (B): Means, Standard Deviations and t-Tests for Study 1.**

Study 1

Control Group (CG) by Gender *Female (f) (N=19)*			*Male (m) (N=11)*				**Experimental Group (EG) by Gender** *Female (N=18)*			*Male (N=11)*			**EG/CG by Gender**		
A*			**B****			**A-B**			**A**			**B**			**A - B**		
f	**m**		**f**	**m**		**f**	**m**		**f**	**m**		**f**	**m**		**f - m**		
M (s)	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M**	**M**	**p**
36.4 (4.9)	35.7 (3.3)	**0.70**	37.3 (5.6)	37.8 (4.8)	**0.9**	0.9 (3.3)	2.0 (2.2)	**0.32**	40.9 (2.9)	42.1 (2.9)	**0.29**	41.9 (3.3)	43.9 (2.5)	**0.1**	1.1 (2.6)	1.9 (2.6)	**0.46**

As *Table 7* shows, in *Study 1* no significant (p< .05) differences were obtained between male and female trainees in either the control group's post-test or in the experimental group's results.

The Jigsaw program for improving accuracy of decoding emotions from facial expressions was successful without differences between male and female participants.

The findings for ***Study 2*** are summarized in *Tables 8, 9,* and *10.*

Table 8: **Results for Intuitive Judgment (A) and Analytic Judgment (B) for all Test Items. Means, Standard Deviations, t-Tests, and Effect Sizes (ES) for the Post-tests of the Experimental- and Control Group for Study 2.**

Individual Work (N=16)			**Jigsaw** (N=15)			**Individual Work vs. Jigsaw**				
								A-B/		
A **M (s)**	**B** **M (s)**	**A-B** **M (s)**	**A** **M (s)**	**B** **M (s)**	**A-B** **M (s)**	**A-A** **t, (p)**	**B-B** **t, (p)**	**A-B** **t, (p)**	**A-A** **ES**	**B-B** **ES**
36.69	38.50	1.81	38.63	42.03	3.43	1.35	2.48	1.78	0.49s	0.82s
(3.97)	(4.31)	(1.91)	(4.04)	(3.57)	(3.06)	(0.095)	**(0.0095)**	**(0.043)**		
		t=3.81			*t=4.32*					
		(0.000085)			**(0.00035)**					

(One-tailed tests; *A= intuitive rating (immediate judgment of ca. one second.); **B= analytic rating (repeated judgment after ca. six seconds).

Results for the Decoding Tests in ***Study 2*** *(Table 8)* show that there is only a nearly significant difference between individual work and the *Jigsaw* treatment ($p < .09$; ES=0.49s), but a considerable (ES = 0.82s) and statistically significant difference ($p < .0095$) between the experimental and the control condition for analytic judgment which favors the cooperative learning format. There are also significant group work improvements from intuitive to analytic judgment in the experimental and comparison conditions ($p < .000085$; $p < .00035$).

The differences in the improvement turned out to be statistically significant ($p < .043$), favoring the cooperative learning group. This finding is confirmed by calculating the proportion of positive changes to all changes made from intuitive to analytical judgments. In *Table 9* the results are summarized.

Table 9: **Results for the Proportion of Positive Changes from Intuitive Judgment (A) to Analytic Judgment (B) to all Changes. Means, Standard Deviations, T-Tests, and Effect Sizes (ES) for Study 2.**

Variable	**Individual Work (N=16)**	**Group Work (Jigsaw) (N=15)**	**Individual/Group Work**	
			t-test	**ES**
	M (s)	**M (s)**	**t/p**	
Positive changes/ all changes	0.61 (0.19)	0.78 (0.13)	2.98 **p<0.003**	0.89s

* positive changes/positive changes + negative changes (one-tailed-test)

In *Table 10* the findings for male and female subjects are summarized.

Table 10: **Findings for Male and Female Participants for Intuitive Judgment (A) and Analytic Judgment (B): Means, Standard Deviations and t-Tests for Study 2.**

Individual Work by Gender									**Jigsaw by Gender**								
Female (f) (N=12)			***Male (m)*** (N=4)						***Female*** (N=11)			***Male*** (N=4)					
A			**B**			**A-B**			**A**			**B**			**A-B**		
f	**m**		**f**	**m**		**f**	**m**		**f**	**m**		**f**	**m**				
M (s)	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**	**M (s)**	**M (s)**	**p**
37.2 (4.2)	35.1 (1.7)	**0.38**	39.3 (4.6)	36.0 (2.4)	**0.19**	2.1 (2.0)	0.9 (1.3)	**0.27**	38.9 (4.2)	37.9 (4.2)	**0.68**	42.2 (4.2)	41.6 (0.9)	**0.8**	3.3 (2.9)	3.8 (3.9)	**0.8**

(Two-tailed tests; *A= intuitive rating (immediate judgment of ca. one second.); **B= analytic rating repeated judgment after ca. six seconds).

As shown in *Table 10,* no significant ($p < .05$) differences were obtained between male and female trainees in either post-test groups.

Results from the Course/Instructor Evaluation Questionnaire (CIEQ) for Study 1. In *Table 11* the results are summarized.

Table 11: **Results for the Participant Evaluation (CIEQ). Means, Standard Deviations, t-Tests, and Effect Sizes (ES) for Post-tests of the Experimental Group (Jigsaw) and Control Group (no Training) for Study 1.**

Subscale:	**Experimental Group (A) (Jigsaw) (N=22) M (s)**	**Control Group (B) (Lecture) (N=25) M (s)**	**(A vs. B) t, (p)**	**ES**
General Course Attitude	**1.617 (0.36)**	**1.49 (0.36)**	**1.18** (0.24)	**0.34s**
Method of Instruction	**1.792 (0.41)**	**1.65 (0.29)**	**1.38** (0.17)	**0.48s**
Course Content	**1.943 (0.54)**	**1.63 (0.33)**	**2.36** ***(0.02)***	**0.94s**
Interest and Attention	**1.807 (0.41)**	**1.60 (0.30)**	**1.981** ***(0.05)***	**0.69s**
Instructor	**1.673 (0.38)**	**1.682 (0.30)**	**0.092** (0.93)	**0.03s**
Total	**1.734 (0.30)**	**1.61 (0.22)**	**1.73 (0.09)**	**0.56s**

Two-tailed Test. Four point scale. 1 = strongly agree; 4 = strongly disagree.

The results, as summarized in *Table 11,* show a moderate evaluation of the program by the trainees in general (norms provided by Aleamoni & Stephens, 1985). In contrast to a traditional lecture, taken as the comparison condition, the course content, interest level and attention were rated significantly less positively rated in the group work condition *(Jigsaw).*

Results from the Course/Instructor Evaluation Questionnaire (CIEQ) for Study 2. In *Table 12* the results are summarized.

Table 12: **Results for the Participant Evaluation (CIEQ). Means, Standard Deviations, t-Tests, and Effect Sizes (ES) for Post-tests of the Experimental Group (Jigsaw) and the Comparison Group (Individual Work) for Study 2.**

Subscale:	Experimental Group (A) (Jigsaw) (N=14) M (s)	Comparison Group (B) (Individual Work) (N=13) M (s)	A vs. B t, (p)	ES
General Course Attitude	1.517 (0.57)	1.442 (0.41)	0.394 (0.70)	0.18s
Method of Instruction	1.643 (0.47)	1.462 (0.71)	0.98 (0.37)	0.25s
Course Content	1.536 (0.29)	1.519 (0.37)	0.128 (0.90)	0.05s
Interest and Attention	1.643 (0.56)	1.731 (0.26)	0.516 (0.61)	0.34s
Instructor	1.561 (0.38)	1.369 (0.30)	1.45 (0.16)	0.64s
Total	1.851 (0.40)	1.505 (0.29)	0.570 (0.26)	1.19s

Two-tailed Test. Four point scale. 1 = strongly agree; 4 = strongly disagree.

As shown in *Table 12,* there are no statistical differences in participants' evaluation of the two working conditions: Both, individual and group work participants evaluated this course more favorable than those in *Study 1.*

Discussion

The results of these two studies are promising. They reveal that there were considerable and statistically significant improvements in the accuracy of both intuitive and analytic judgments in decoding affects from facial expressions as a result of systematic instruction based on a theoretical presentation, discrimination training, and familiarization with techniques for analyzing facial expressions of emotion. **Research Question 1** can be answered positively. These results are in line with those of international research (see above).

Interestingly, both studies show significant improvements from intuitive to analytic judgment under both experimental conditions **(Research Question 2 and 5).** These improvements, however, were enhanced only slightly by the intervention in ***Study 1***, and did not achieve statistical significance ($p < .25$; $p < .12$; ES = 0.40s). In earlier studies (Klinzing, 1999; 2002a), this improvement was significantly enhanced indicating that training not only improved the more global, intuitive, and unreliable approach to decoding, but also successfully supported the analytic approach. It is important to note that training in ***Study 1*** was conducted under unfavorable conditions which led also to a foreshortened period of instruction.

In ***Study 2***, significant differences occurred in the quality of analytic judgment and in its improvement between the two modes of instruction (Jigsaw vs. individual work). Results in favor of cooperative learning indicate that analytic ability can be enhanced more effectively by group work than by individual work, given sufficient time and appropriate learning conditions **(Research Question 5)**. That the individual work group needed *20 percent* less time than the group work is not considered an advantage given the inferior quality of its results.

In contradiction to previous research, especially that done in the United States, no significant gender effects could be observed in either study among German students of education **(Research Question 4 and 6).** This finding is supported by other German studies reported by Rosenthal et al. (1979) using the PONS- test and Klinzing (1999; 1998). This finding may be explained by cultural differences between the US and Germany.

Participants rated the training program only moderately high in *Study 1*, possibly due to the lack of training time and the unfavorable conditions in which the training took place. Because group work unexpectedly placed a heavier work load on the participants, it was rated less favorably than the proceeding lecture-only format. In *Study 2*, the program was rated more favorably, with no significant differences between the two modes of instruction.

In conclusion, these studies showed that the improvement of social competence within a university education curriculum can be achieved through the integration of laboratory experiences and cooperative learning techniques specifically designed to improve nonverbal communication.

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Address:

Prof. Dr. Hans Gerhard Klinzing;
Brahmsweg 19;
D- 72076 Tuebingen, Germany

Phone/Fax: **49 7071 65430
Mobile Phone: 0170 29 15430

e-mail: hans-gerhard.klinzing@uni-tuebingen.de
hansgklinzing@freenet.de

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Signature:	Printed Name/Position/Title: PROF. DR. HANS G. KLINZING	
Organization/Address: BRAHMSWEG 19 D-72076 TUEBINGEN	Telephone: +49 7071-65430	Fax: +49 7071-65430
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